FIRE BARRIER TEST PROGRAM

Test #2 – Hemyc (1-Hour) Direct Attachment and Framed for Air Gap

Test Article Assembly Checklist

Reference Basis: "Plan for Hemyc (1-Hour) and M.T. (3-Hour) Electrical Raceway Fire Barrier Systems Performance Testing," Revision J, December 21, 2004. (Referred to as "the test plan" in this document.)

A. Pre-Instrumentation Test Specimen Assemblies Check

(1) 12-inch cable tray No.1 2A (Direct)

Action	Initials	Date
Verify that the cable tray assembly conforms to arrangement and dimensions as shown in Figure A4 of the test plan. Ensure the weight of the empty cable tray is determined and recorded. Note any discrepancies and associated resolution actions below.	CLC	1/26/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

(2) 12-inch cable tray No.2 2B (2" Air gap)

Action	Initials	Date
Verify that the cable tray assembly conforms to arrangement and dimensions as shown in Figure A4 of the test plan. Ensure the weight of the empty cable tray is determined and recorded. Note any discrepancies and associated resolution actions below.	CKB	1/26/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

(3) 36-inch cable tray No.1 2C (Direct)

Action	Initials	Date
Verify that the cable tray assembly conforms to arrangement and dimensions as shown in Figure A5 of the test plan. Ensure the weight of the empty cable tray is determined and recorded. Note any discrepancies and associated resolution actions below.	CLb	1/26/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

(4) 36-inch cable tray No.2 2D (Air gap 2")

Action	Initials	Date
Verify that the cable tray assembly conforms to arrangement and dimensions as shown in Figure A5 of the test plan. Ensure the weight of the empty cable tray is determined and recorded. Note any discrepancies and associated resolution actions below.	CLb	1/26/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

(5) Junction Box 2G JB only JB plus Supports

Action	Initials	Date
Verify that the junction box and its support assembly conform to arrangement and dimensions as shown in Figure A6 of the test plan. Ensure the weight of the empty junction box is determined and recorded. Note any discrepancies and associated resolution actions below.	CLG	1/26/05

JB only

Discrepancies Noted:

JB only 4/20/05

Resolution Actions to be Completed Prior to Approval:

(6) Photographs of Assembled Test Specimens

Action	Initials	Date
Verify that color or digital photographs have been taken of each assemble test specimen. Note any discrepancies and associated resolution actions below.	FJW	3/21/05

Discrepancies Noted:

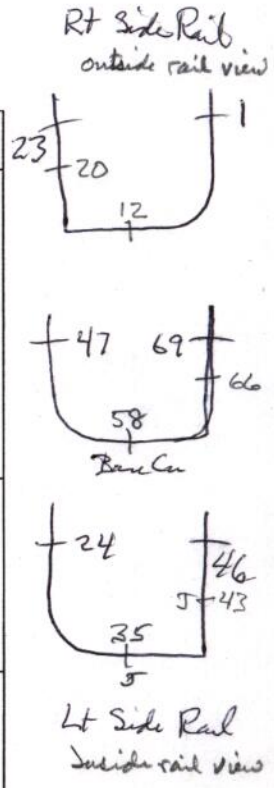
~~Check?~~

Resolution Actions to be Completed Prior to Approval:

B. Thermocouple Installation of Test Specimen Assemblies Check

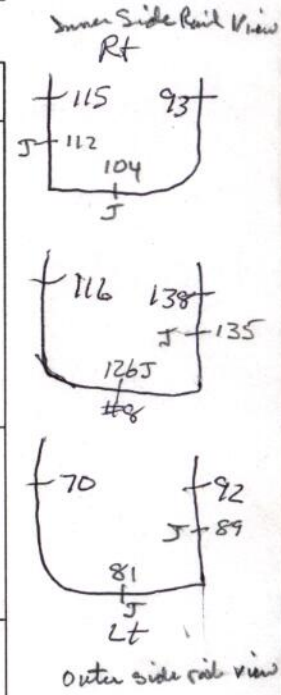
(1) 12-inch cable tray No.1 2A

Action	Initials	Date
Verify that the thermocouple locations on the cable tray assembly conform to the general arrangement and spacing as depicted in Figure A13 of the test plan. Ensure each thermocouple is securely fastened to the outer surface of the side rail. Ensure thermocouples are attached to both side rails. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.	FJW	2/7/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		



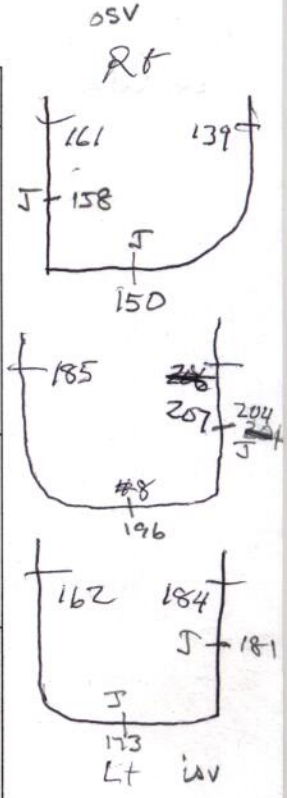
(2) 12-inch cable tray No.2 2B

Action	Initials	Date
Verify that the thermocouple locations on the cable tray assembly conform to the general arrangement and spacing as depicted in Figure A13 of the test plan. Ensure each thermocouple is securely fastened to the outer surface of the side rail. Ensure thermocouples are attached to both side rails. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.	FJW	2/7/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		



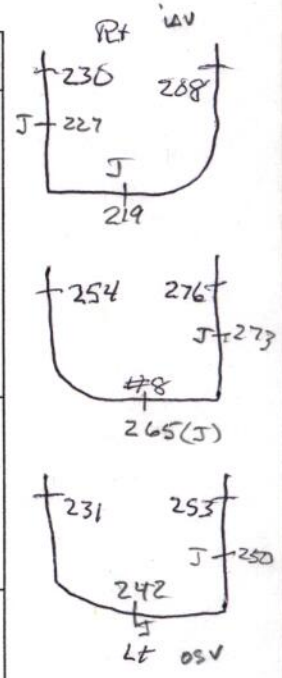
(3) 36-inch cable tray No.1 2C

Action	Initials	Date
Verify that the thermocouple locations on the cable tray assembly conform to the general arrangement and spacing as depicted in Figure A14 of the test plan. Ensure each thermocouple is securely fastened to the outer surface of the side rail. Ensure thermocouples are attached to both side rails. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.	FJW	2/7/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		



(4) 36-inch cable tray No.2 2D

Action	Initials	Date
Verify that the thermocouple locations on the cable tray assembly conform to the general arrangement and spacing as depicted in Figure A14 of the test plan. Ensure each thermocouple is securely fastened to the outer surface of the side rail. Ensure thermocouples are attached to both side rails. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.	FJW	2/7/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		



(5) Junction Box 2G

Action	Initials	Date
Verify that the thermocouple locations on the junction box conform to the general arrangement and spacing as depicted in Figure A15 of the test plan. Ensure each thermocouple is securely fastened to the outer surfaces of the junction box. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.	FJW	3/21/05
Discrepancies Noted: ~~JB T/Cs to be mounted following stand-off construction. FJW 2/7/05~~ Decision made to direct wrap JB and secure w/ bands. Also to set wrapped box on top of insulation around horizontal supports. FJW 3/21/05		
Resolution Actions to be Completed Prior to Approval:		

(6) Photographs of Instrumented Test Specimens

Action	Initials	Date
Verify that color or digital photographs have been taken of each instrumented test specimen. Ensure photographs include spacing reference scales. Note any discrepancies and associated resolution actions below.	FJW	3/21/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

~~cleda~~?

2E Cable drop (~~Air gap~~ Direct) FJW 3/21/05

2F Cable drop (Air gap) FJW 3/21/05

C. Thermocouple Installation on Bare Copper Wire Checks

Action	Initials	Date
Verify that the thermocouple locations on each of the six bare copper wires conform to the 6-inch spacing intervals, beginning and ending approximately 3-inches above the test deck and throughout the length of wire located below the deck plane, as required in the test plan. Ensure each thermocouple is securely fastened to the bare copper wire. Ensure the location of each thermocouple is recorded and identified with a unique tag number. Note any discrepancies and associated resolution actions below.		
(1) Bare Copper Wire to be installed in empty 12-inch Cable Tray No. 1 2A	FJW	2/8/05
(2) Bare Copper Wire to be installed in empty 12-inch Cable Tray No. 2 2B	FJW	2/8/05
(3) Bare Copper Wire to be installed in empty 36-inch Cable Tray No. 1 2C	FJW	2/8/05
(4) Bare Copper Wire to be installed in empty 36-inch Cable Tray No. 2 2D	FJW	2/8/05
(5) Bare Copper Wire to be installed with Cable Drop bundle No. 1 2E	FJW	2/8/05
(6) Bare Copper Wire to be installed with Cable Drop bundle No. 2 2F	FJW	2/8/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

D. Instrumented Bare Copper Wire Installation Checks

Action	Initials	Date
Verify that the six instrumented bare copper wires are installed on the bottom of the cable tray rungs as specified in the test plan. Ensure each instrumented wire runs the full length of the cable tray. Ensure each instrumented wire is securely fastened to the cable tray rungs. For the Cable Drops, ensure the instrumented copper wires are combined into a bundle with other (non-instrumented) bare copper wires. Note any discrepancies and associated resolution actions below.		
(1) 12-inch cable tray No. 1 2A (D.A.)	FJW	2/7/05
(2) 12-inch cable tray No. 2 2B (A.G.)	FJW	2/7/05
(3) 36-inch cable tray No. 1 2C (D.A.)	FJW	2/7/05
(4) 36-inch cable tray No. 2 2D (A.G.)	FJW	2/7/05
(5) Copper wire bundle to form the Cable Drop No. 1 [7 wires] 2E (D.A.)	FJW	2/8/05
(6) Copper wire bundle to form the Cable Drop No. 2 [7 wires] 2F (AG)	FJW	2/8/05
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

291-307
308-324

E. Test Specimen Installation Checks

Action	Initials	Date
Verify that each of the ten test specimens are securely mounted and attached to the test deck and that each test specimen is located and oriented to conform to the raceway layouts as indicated in OPL Figures 1 and 2. Ensure all thermocouple lead wires are run up through to the top of the test deck. Ensure that color or digital photographs have been taken of the complete test article assembly. Note any discrepancies and associated resolution actions below.	FJW	3/24/05
Discrepancies Noted: ~~Photos?~~ ~~Data?~~		
Resolution Actions to be Completed Prior to Approval:		

The undersigned certifies that the test article assembly has been completed in accordance with the provisions and requirements of the test plan except as noted and that the test specimens are ready for installation of the ERFBS.

Francis J. Wyant	Francis J. Wyant	3/24/05
Printed Name	Signature	Date

Comments:

FIRE BARRIER TEST PROGRAM

Test #2 – Hemyc (1-Hour) Direct Attachment and Framed for Air Gap

Test Article ERFBS Checklist

Reference Basis: "Plan for Hemyc (1-Hour) and M.T. (3-Hour) Electrical Raceway Fire Barrier Systems Performance Testing," Revision K, February 6, 2005. (Referred to as "the test plan" in this document.)

A. Pre-Installation Test Specimen Blanket Checks

(1) 2A: 12-inch cable tray (Direct Attachment)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2A = 3 - Thickness of each pad at least 2-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). Note any problems and associated resolution actions below.	BLL	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

(2) 2B: 12-inch cable tray (Air Gap)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2B = 12 - Thickness of each pad at least 1½-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). - Check air gap framing structure. Note any problems and associated resolution actions below.	BLL	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

(3) 2C: 36-inch cable tray (Direct Attachment)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2C = 12 - Thickness of each pad at least 2-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). Note any problems and associated resolution actions below.	~~DLK~~	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

(4) 2D: 36-inch cable tray (Air Gap)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2D = 12 - Thickness of each pad at least 1½-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). - Check air gap framing structure. Note any problems and associated resolution actions below.	~~DLK~~	3/20/2005
Problems Noted: Fabric tears exist on two inside pads		
Resolution Actions to be Completed Prior to Approval: Sew up tears		

(5) 2E: Cable Drop Loop (Direct Attachment)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2E = 5 - Thickness of each pad at least 2-inches. 3p + 2 collars - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). Note any problems and associated resolution actions below.	[illegible]	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

(6) 2F: Cable Drop Loop (Air Gap)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2F = 2 - Thickness of each pad at least 1½-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). Note any problems and associated resolution actions below.	[illegible]	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

(7) 2G: Junction Box (Air Gap) & Support Assembly (Direct Attachment)

Action	Initials	Date
Check the quality of the individual Hemyc pads to be installed: - Total number of pads for test specimen 2G = 2 - Thickness of each pad at least 1½-inches. - Check outer covers for tears or openings. - Check all seams for workmanship (complete, no gaps, etc.). - Check air gap framing structure. Note any problems and associated resolution actions below.	~~DAL~~	3/20/2005
Problems Noted:		
Resolution Actions to be Completed Prior to Approval:		

B. Test Specimen Assemblies Hemyc Installation Checks

(1) 2A: 12-inch cable tray (Direct Attachment)

Action	Initials	Date
Monitor Hemyc installation on the raceway and perform the following checks: - Ensure wraps completely enclose the raceway without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that overlap joints are secure and cover the adjoining blanket by at least 2-inches. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~[illegible]~~	3/22/2005
Discrepancies Noted: Long radius elbow wrap has 2" butt overlap. Material is insufficient to bend over butt by 2". Gap exists between overlapping vertical pads on 90° vertical bend.		
Resolution Actions to be Completed Prior to Approval: The butt overlap is acceptable with ~~insufficient~~ steel bands. ~~Sew gap closed~~ Gap does not penetrate through to inside of raceway (2" overlap is maintained).		

(2) 2B: 12-inch cable tray (Air Gap)

Action	Initials	Date
Monitor Hemyc installation on the raceway and perform the following checks: - Ensure wraps completely enclose the raceway without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that overlap joints are secure and cover the adjoining blanket by at least 2-inches. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~[illegible]~~	3/22/2005
Discrepancies Noted: Side and outside Long radius elbow wraps extend 4" above ceiling level. Inside pads extend 5 to 5½" above ceiling level. Gaps exist at two overlapping locations on bottom pads		
Resolution Actions to be Completed Prior to Approval: wrap extension distance is ok with the addition of ceiling and penetration insulation. Sew gaps closed		

(3) 2C: 36-inch cable tray (Direct Attachment)

Action	Initials	Date
Monitor Hemyc installation on the raceway and perform the following checks: - Ensure wraps completely enclose the raceway without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that overlap joints are secure and cover the adjoining blanket by at least 2-inches. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~[illegible]~~	3/22/2005
Discrepancies Noted: Inside pad on long radius elbow extends 4" above the ceiling level. Air gaps exist on vertical inside overlapping pads of 90° elbow		
Resolution Actions to be Completed Prior to Approval: Wrap extension distance is sufficient with the addition of ceiling and penetration insulation. ~~Sew~~ Band gaps closed		

(4) 2D: 36-inch cable tray (Air Gap)

Action	Initials	Date
Monitor Hemyc installation on the raceway and perform the following checks: - Ensure wraps completely enclose the raceway without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that overlap joints are secure and cover the adjoining blanket by at least 2-inches. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~[illegible]~~	3/23/2005
Discrepancies Noted: Inside pads extend above the ceiling level by 4" for the long radius elbow and 5" for the 90° elbow. Outside pads extend 4" above the ceiling level. An airspace exists at the bottom center where the two pads overlap and sag. Gaps exist on long radius elbow side-outside overlaps. Inside and side pad tears exist on 90° elbow.		
Resolution Actions to be Completed Prior to Approval: Weld threaded standoffs to the center bottom air gap cross support to accommodate overlapping sagging pads. Wrap extension distance is sufficient with the addition of ceiling and penetration insulation. Sew gaps and tears closed.		

(5) 2E: Cable Drop Loop (Direct Attachment) *

Action	Initials	Date
Monitor Hemyc installation on the cable drop and perform the following checks: - Ensure wraps completely enclose the cable drop loop without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that collar joints are secure and cover the adjacent blankets without gaps or openings. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~BLM~~	3/22/2005
Discrepancies Noted: Tear exists on vertical section below sleave Need to install collared butt joint on vertical section of one drop.		
Resolution Actions to be Completed Prior to Approval: Sew ~~gap~~ tear closed Cut insulation off at & above TC 321. Install butt jointed insulation section and collar at butt joint.		

(6) 2F: Cable Drop Loop (Air Gap) *

Action	Initials	Date
Monitor Hemyc installation on the cable drop and perform the following checks: - Ensure wraps completely enclose the cable drop loop without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Verify that overlap joints are secure and cover the adjoining blanket by at least 2-inches. - Check that the metal bands are attached to the blanket wraps on a maximum of 9-inches centers. - Check that the metal bands do not compress the blankets more than ¼ - ½ inches. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	~~BLM~~	3/22/2005
Discrepancies Noted: Tears exist on one sleave.		
Resolution Actions to be Completed Prior to Approval: Sew tear closed.		

* The locations of the Field Test Samples, 2E & 2F are reversed from that shown on the original drawings.

(9) 2G: Junction Box (Air Gap) & Support Assembly (Direct Attachment)

Action	Initials	Date
Monitor Hemyc installation on the junction box and support assembly perform the following checks: - Ensure wraps completely enclose the junction box and supports without gaps or visible openings. - Check that all joints and sewn seams have no gaps or openings. - Check for obvious gaps & distortions of the completed blanket wraps. - Verify that the wrap extends up each vertical leg by 6 – 12 inches above the top of the test deck. - Ensure all construction aid wires/tape have been removed. Note any discrepancies and associated resolution actions below.	[illegible]	3/22/2005
Discrepancies Noted: Tear exists on fabric pad top		
Resolution Actions to be Completed Prior to Approval: Sew tear closed		

(10) Photographs of Wrapped Test Specimens

Action	Initials	Date
Verify that color or digital photographs have been taken of each wrapped test specimen. Ensure photographs include spacing reference scales. Note any discrepancies and associated resolution actions below.	[illegible]	3/23/2005
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

C. Test Assembly Completion Checks

Action	Initials	Date
Complete the following checks of the test assembly: - Verify that the underside of the test deck is insulated. - Ensure that no gaps or openings exist between the vertical sections of each test specimen and the test deck. - Ensure that all raceway openings are plugged above the test deck. - Ensure that color or digital photographs have been taken of the complete test assembly. Note any discrepancies and associated resolution actions below.	[signature]	3/23/2005
Discrepancies Noted:		
Resolution Actions to be Completed Prior to Approval:		

The undersigned certifies that the test article assembly has been completed in accordance with the provisions and requirements of the test plan except as noted and that the test specimens are ready for installation in the test furnace.

BRUCE L. LEVIN — Printed Name
[signature] — Signature
3/23/2005 — Date

CLEDA PATTON [signature] 3-25-05
Comments: OPL QA/QC agrees w/ checklist